

# Boiler Installation

Presented by:  
North Dakota Boiler  
Inspection Program

# Mailing Address:

Department of Environmental Quality  
Boiler Inspection Program  
4201 Normandy St  
Bismarck, ND 58503-1324

# Contact Us:

## Bismarck:

Trevor S Seime, Chief Inspector  
701-220-4723 cell  
[tsseime@nd.gov](mailto:tsseime@nd.gov)

Renee Skraba, Deputy Inspector  
701-400-1043 cell  
[rskraba@nd.gov](mailto:rskraba@nd.gov)

Bismarck Fax: 701-328-5200

## Fargo:

Nicolle Fowler, Deputy Inspector  
701-541-2113 cell  
[nfowler@nd.gov](mailto:nfowler@nd.gov)

Vincent Rolczynski, Deputy Inspector  
701-781-0528 cell  
[vrolczynski@nd.gov](mailto:vrolczynski@nd.gov)

Website: <https://deq.nd.gov/Director/BIP/>

# Where do we have jurisdiction?

- ❑ Any size of boiler in a six-unit apartment or larger.
- ❑ Any size of boiler in buildings where the public is invited. Exemptions are federally controlled buildings and farm use buildings.
- ❑ Any water heater or pool heater larger than 200,000 BTU/HR input at above locations.
- ❑ Antique/historical boilers at public shows.

# Introduction:

- ❑ Focus on hot water heating systems.
- ❑ Clearances - make a good plan from the start of the installation.
- ❑ Requirements and controls for all boilers.
- ❑ Other boiler installation tips.
- ❑ Water heater and pool heater installs.
- ❑ Installer form - a requirement.

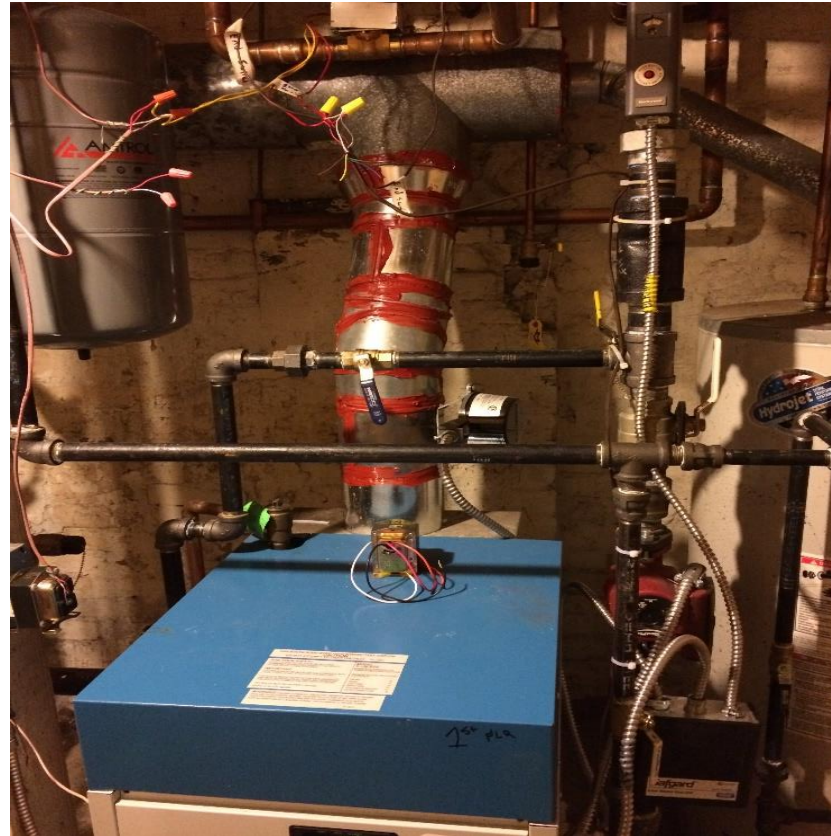
# Boiler Clearances:

- ❑ Heating boilers shall have a minimum distance of at least 36” between all sides of the heating boiler and adjacent walls, structures, or other equipment.
- ❑ Alternative clearances in accordance with the manufacturer’s service and maintenance recommendations are subject to acceptance by the Chief Inspector.
- ❑ If it will not fit, it cannot be installed.
- ❑ It will **not** be easier to obtain forgiveness after the fact than to get permission beforehand.

# Nice Installation vs. Clearance Problems



Room to operate and service the boiler...



Hard to get around the equipment,  
piping crossing back and forth...



# Good spacing, clean boiler room



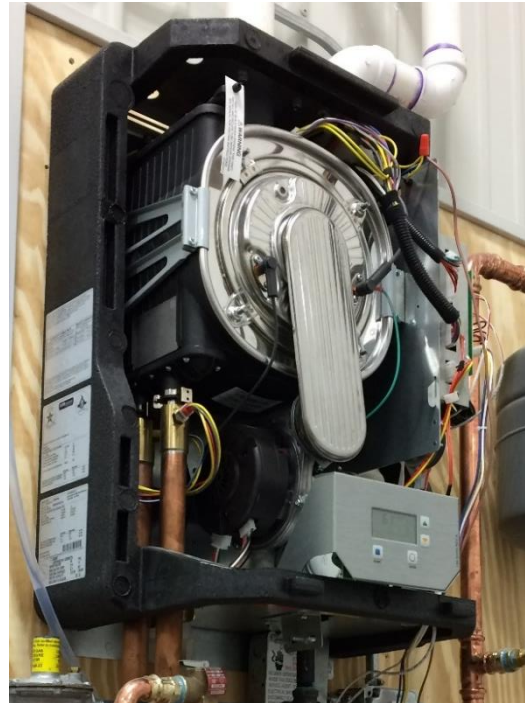


# Boiler Stamping:

- ❑ Steel, stainless steel, and electric boilers must have an ASME stamp and be National Board registered.
- ❑ Cast iron and cast aluminum boilers must have an ASME stamp. (NB registration not required for cast.)

# Some boiler designs not acceptable:

- ❑ Code stamped boilers, but some not always acceptable to State due to internal piping and control issues.



\*\*\*Please call us before installing a boiler you have not used before as new products come on the market all the time and may not meet State Boiler Code even with the correct ASME and National Board stamping.

# Boiler Requirements and Controls:

1. Two temperature controls - one with manual reset and lockout
2. Testable low-water cut off with manual reset and lockout, or flow switch
3. Expansion tank with stop valve
4. Safety relief valve
5. Temperature and pressure gauge
6. Isolation valves
7. Drain valve
8. Electrical switch
9. E-stop (required over 400,000 BTU/HR input)
10. Makeup water system - not always required (RPZ, regulator with bypass, and feed line stop valve)
11. Venting
12. Combustion Air
13. Recommend condensate neutralizer kit for all high efficiency appliance exhaust drains

## 1. Two Temperature Controls - one with manual reset

Many of the operating and manual reset high limit controls are factory installed and internal to the boiler, if the temp setting are correct, no other controls are required.



The Honeywell L4006E1125/U or equivalent with a dial range of 100-200F is the correct control for high efficiency boilers that require an external control.

- ❑ High efficiency stainless steel boilers have a maximum allowable working temp (MAWT) of 200F or 210F
- ❑ Cast aluminum MAWT 200F
- ❑ Cast iron MAWT 240F or 250F
- ❑ Steel boilers MAWT 250F
- ❑ Copper fin tube boilers MAWT 210-250F
- ❑ The dial range of your manual reset high limit control cannot exceed the MAWT of the boiler.
- ❑ The lowest MAWT is the determining factor for setting the MRHL control on all boilers in the system.

## 2. Low Water Protection...

### Low Water Fuel Cutoff vs. Flow Switch

- ❑ Low water fuel cutoff is required for cast iron, cast aluminum, fire tube boilers and some electric boilers:
- ❑ The low water fuel cutoff must be testable and have a manual reset and lockout (per ASME CSD-1).
- ❑ Must be installed on the boiler proper above the safe water line or on the boiler supply outlet piping (hot side) before the first isolation valve. May not be installed beneath the boiler.
- ❑ Flow switch is required for water tube boilers, fired coil boilers, pool heaters and some electric boilers:
- ❑ Consideration should be made to match the flow rate and piping size to the type of flow switch.
- ❑ Must be installed on the primary boiler loop in primary/secondary piping.
- ❑ Recommend to install inside the boiler isolations valves - easier to service.
- ❑ Test once installed to verify it shuts down the boiler.



## 2a. Common Fire Tube and Water Tube boilers:



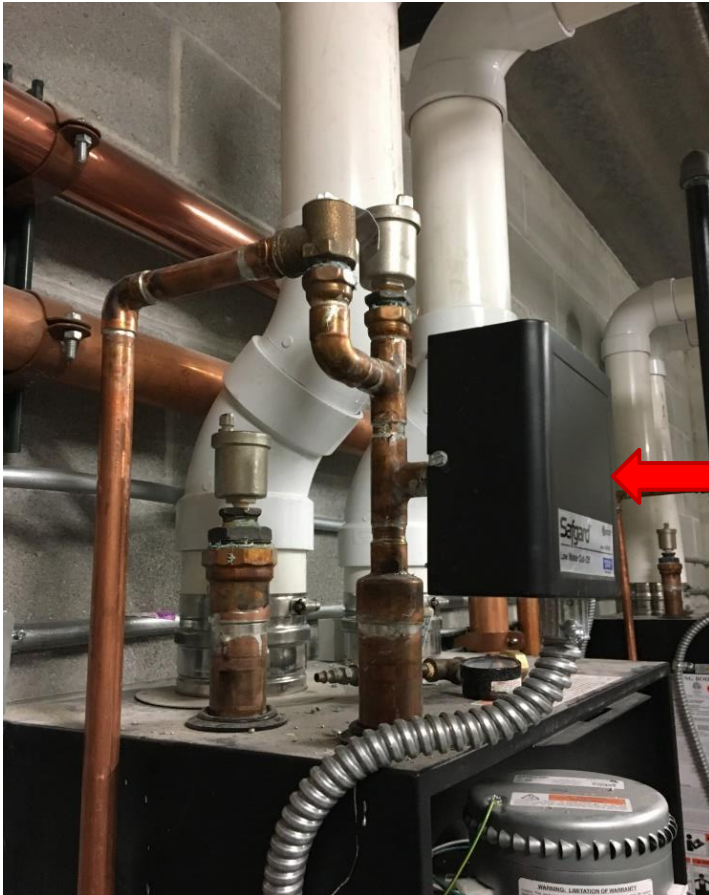
Fire Tube - Low Water Cutoff



Water Tube - Flow Switch

## 2b. Low Water Fuel Cutoff Examples:

Correct install for fire tube vertical tube:



Correct install for cast iron:





## 2c. Flow Switch Examples:

Correct installation water tube boiler:



Correct installation electric boiler:



## 2d. Electric Boilers and Low Water Protection:

Low water protection:

- ❑ For vertical element designs (i.e. Electro Industries, Thermolec) a low water fuel cutoff is acceptable.
- ❑ For horizontal element designs (i.e. Slant Fin Monitron) a flow switch is required by the manufacturer.
- ❑ For very large electric boilers the low water protection is usually built in and determined by the manufacturer.

### 3. Expansion Tank with Stop Valve

All expansion tanks require a stop valve between the tank and the system, expansion tanks must be installed on the supply (outlet-hot) side of the boiler.



Non-ASME expansion tank - typically a paper or sticker tag on the tank showing the tank information.





## 4. Safety Relief Valves



- ❑ All safety valves must be installed in the vertical position.
- ❑ Metallic discharge piping is required - copper or black iron. Plastic is not permitted.
- ❑ If a non-ASME expansion tank is installed the safety relief valve must not exceed 30 psi.
- ❑ Pressure settings allowed are determined by the MAWP of the boilers in the system and the type of expansion tank installed, ASME or non-ASME.
- ❑ If more than one boiler is installed and interconnected with the system, the lowest boiler MAWP determines the safety relief valve setting for all of the boilers in the system.

## 5. Pressure/Temperature Gauge



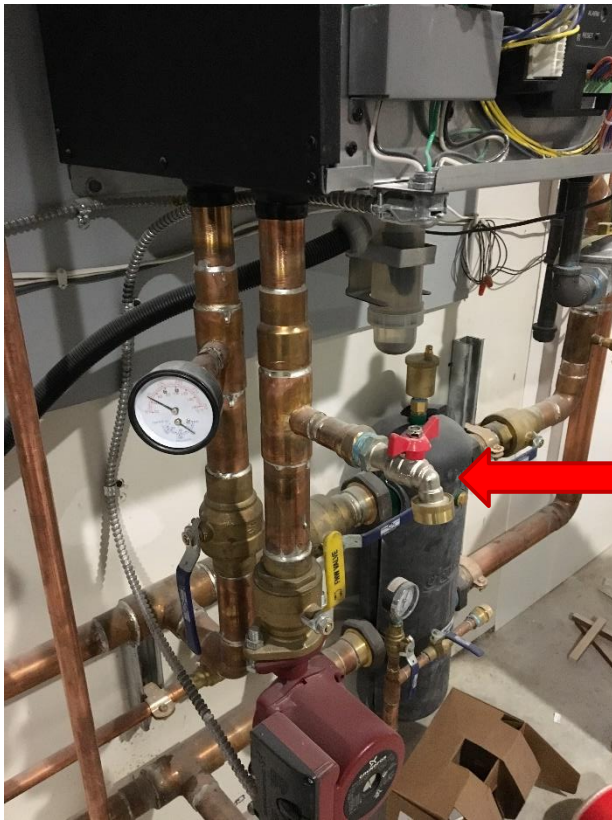
- ❑ The dial range of the pressure gauge must be  $1\frac{1}{2}$  to  $3\frac{1}{2}$  times the setting of the safety relief valve set pressure.
- ❑ If the boiler has a 30 psi relief valve the dial range of the gauge is required to be a minimum of 0-45 psi and a maximum of 0-105 psi.
- ❑ The pressure/temperature gauge must be installed on the boiler proper or on the outlet piping before the first isolation valve.

## 6. Isolation Valves



- ❑ Boiler isolation valves are required on the inlet and outlet of the boiler.
- ❑ They may not isolate any controls from the boiler with the exception of a flow switch.
- ❑ Zone valves and flow control valves are not the required isolation valves.
- ❑ For primary/secondary piping, the isolation valve must be in the primary piping.

## 7. Drain Valve



- ❑ Each boiler must have a drain valve.
- ❑ The minimum size of the drain piping and valves shall be NPS 3/4 .
- ❑ The drain valve must be inside the boundary of the inlet and outlet stop valves.
- ❑ For primary/secondary it must be on the primary piping.



## 8. Electrical Switch



- ❑ Every boiler must have an on/off electrical switch.
- ❑ If there is not a switch factory installed on the boiler, a switch must be installed that is easily accessible to reach from the floor.
- ❑ On/off switches on the ceiling are not accessible.



## 9. Emergency Stop - for all boilers over 400,000 BTU/HR input



- ❑ A manually operated emergency shutoff switch must be located just outside the boiler room door and marked for easy identification. Some exceptions apply with approval.
- ❑ Consideration should be given to safeguard against tampering.
- ❑ If the boiler room door is on the building exterior, the switch must be located just inside the door.
- ❑ The emergency switch or circuit breaker must disconnect all power to the burner controls.

## 10. Makeup Water System - Automatic Water Feeder On, Off or Not Installed

- ❑ A boiler needs low-water protection. A low water cutoff or flow switch satisfy that requirement for new boilers. No feed water regulator is required, and it may be turned off if desired.
- ❑ Older boilers - low-water cutoffs were first required in 1994. If the boiler is installed prior to 1994 and does not have testable low water protection a feed water regulator is required and it must be left on.
- ❑ Broken feed lines require, at a minimum, a vacuum breaker on the city water side. (See Plumbing Code)

## 10a. Correct Water Feed Regulator with RPZ Backflow Preventer



- ☐ Going from right to left into the system.
- ☐ RPZ backflow preventer
- ☐ Feed water regulator with piped bypass line
- ☐ Feed line stop valve before entering the boiler system.
- ☐ Feed water must enter the boiler system on the return, or line to the expansion tank.

# 11. Venting - General Information

- ❑ Type B chimneys are not to be used for solid fuel or oil.
- ❑ Solid fuel and gas or oil equipment can not vent to the same venting system.
- ❑ Single-wall metal venting must be at least 6” from combustible material for gas.
- ❑ For common venting, you must upsize 50% of the area for any additional vent.
- ❑ Horizontal piping must have at least a 2% up slope.
- ❑ Modifying vent hoods to fit is not allowed.
- ❑ Consult local jurisdiction if necessary.

## 12. Combustion Air

- ❑ Most high efficiency boilers have combustion air directly piped from the outside.
- ❑ Many conventional replacement and new boiler installations have incorrect combustion air.
- ❑ Combustion air is figured at 1 sq. in. per 4,000 BTU/HR input - two openings required, or 1 sq. in. per 3,000 BTU/HR of input - one opening.
- ❑ Professionally designed combustion air recommended for any other design.
- ❑ All dampers, louvers or supply fans must be interlocked with the burner in a fail-safe manner.
- ❑ Mechanical air exhausting must also be considered when sizing combustion air.



### 13. Condensate Neutralizer Kit - recommended for all high efficiency boilers and water heaters



Washes away surrounding concrete, metal drains and piping. Installed 3 years ago.

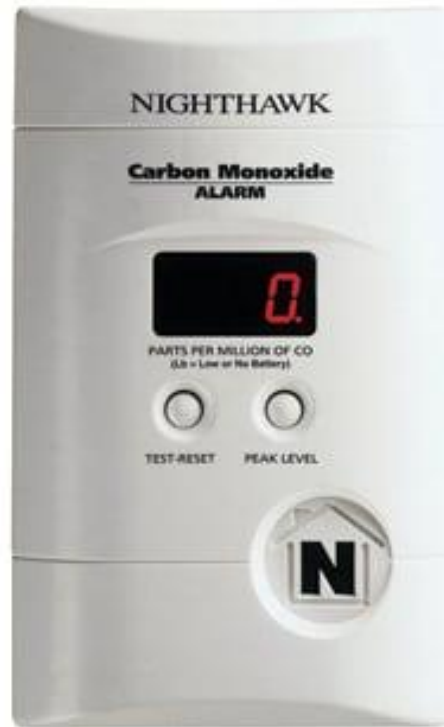


Condensate neutralizer - one example



# Other Boiler Installation Tips.....

# Carbon Monoxide Detector/Alarm



The owner or user shall install a carbon monoxide (CO) detector/alarm in equipment rooms where fuel fired boilers and/or fuel fired pressure vessels are located in accordance with the authority having Jurisdiction.

# Replacement Boilers

- ❑ Controls and piping must be updated. The replacement boilers must be installed to current code and any re-used controls must meet current code.
- ❑ Clearances must meet the new boiler listing and state boiler code.
- ❑ You **cannot** exchange like for like and not make updates to the system.
- ❑ Considerations for old systems and new boilers
  - not all high efficiency boilers are tolerant of old piping and dirty systems - cleaners and filters may be needed
  - some new boilers require special water treatment

# Shop Installation



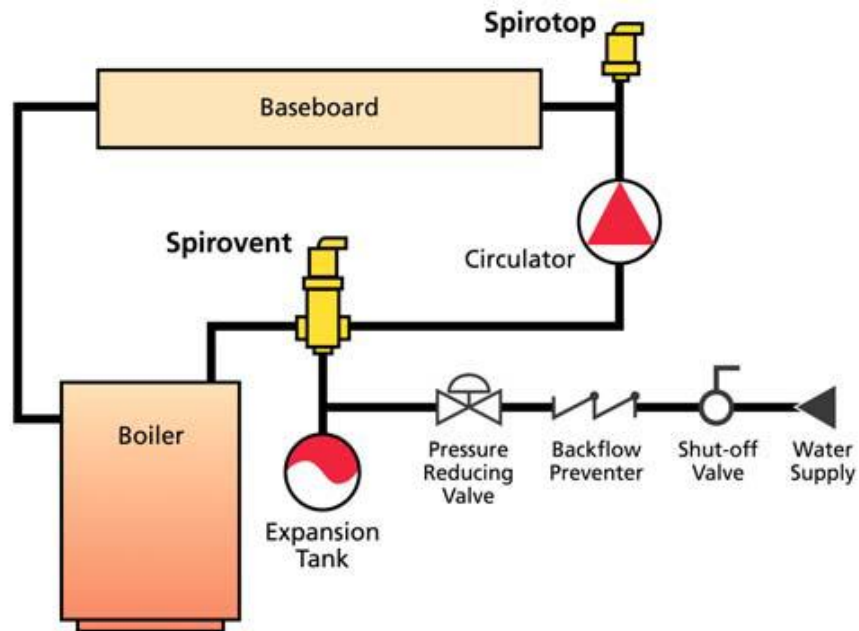
- ❑ Boilers installed in a shop where vehicles can be stored must have the burner at least 18" off the floor.
- ❑ If the boiler is installed in a mechanical room with access from the shop it must still be 18" off the floor.
- ❑ This includes sealed combustion boilers.

## Off Peak or Dual-Fuel Systems

- ❑ We require each boiler to be installed such that either one can operate independent of the other.
- ❑ We require parallel installation. Boilers that flow through each other in series are not permitted. If a flow through design is desired, alternate piping may be installed as bypass.
- ❑ Adding a new boiler to an old system may require isolation valves to be added to the old boiler which was previously “grandfathered” without valves.



# Expansion tanks and air eliminators



- ❑ This is the typical installation of an air eliminator.
- ❑ The air eliminator must be installed on the supply (outlet-hot) side of the boiler.
- ❑ It must be installed on the low pressure side of the circulating pump.
- ❑ The expansion tank should be installed on the bottom connection of the air eliminator.

# Primary/Secondary piping

## VI. Water Piping and Trim C. Standard Installation Requirements (continued)

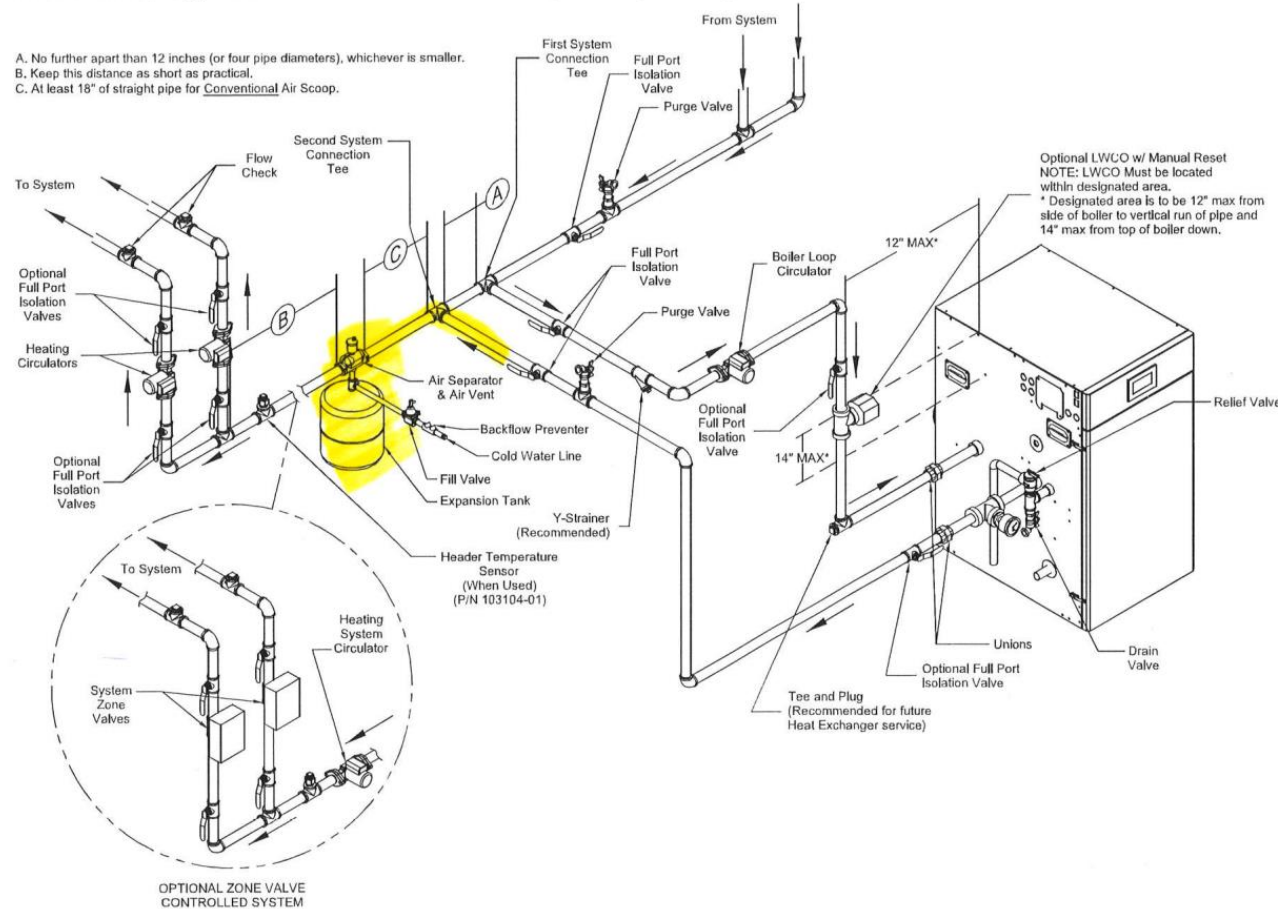
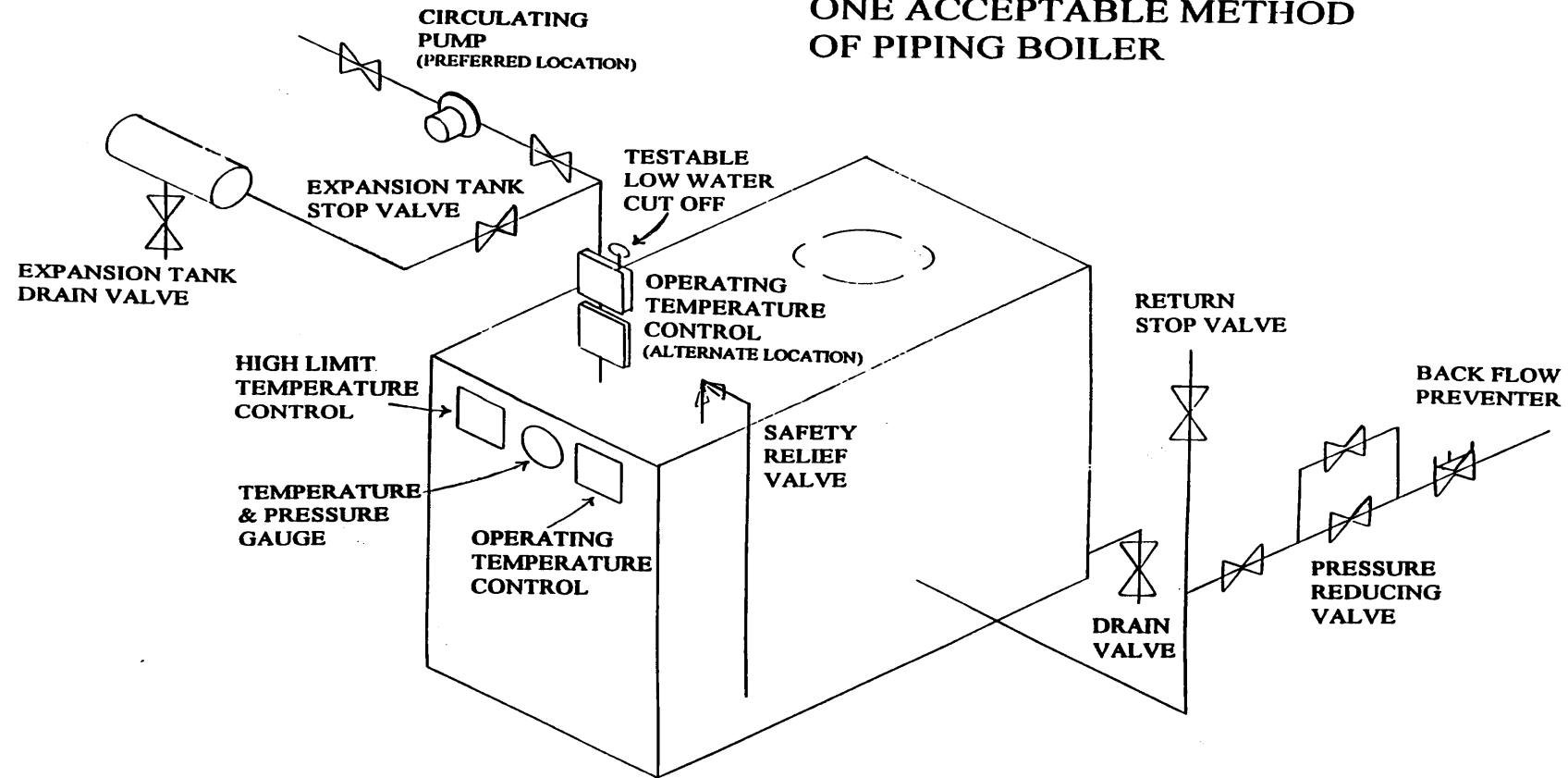


Figure 36: Near Boiler Piping - Heating Only

*From Burnham APEX Instruction manual*

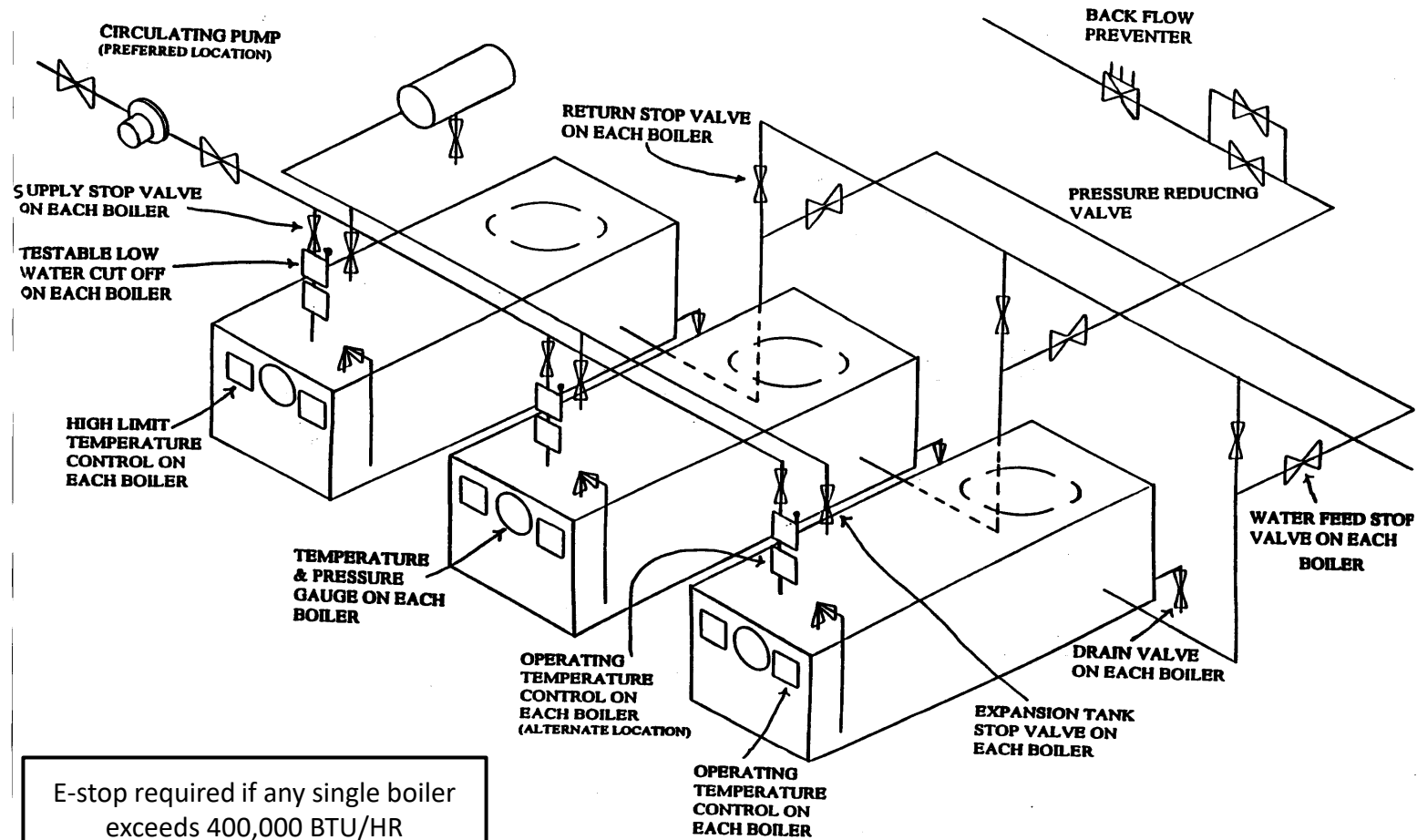
- Great example of primary/secondary piping as shown in the Burnham Apex Installer Guide.
- Air eliminator and expansion tank are on the supply piping on the suction side of the pump.

## ONE ACCEPTABLE METHOD OF PIPING BOILER

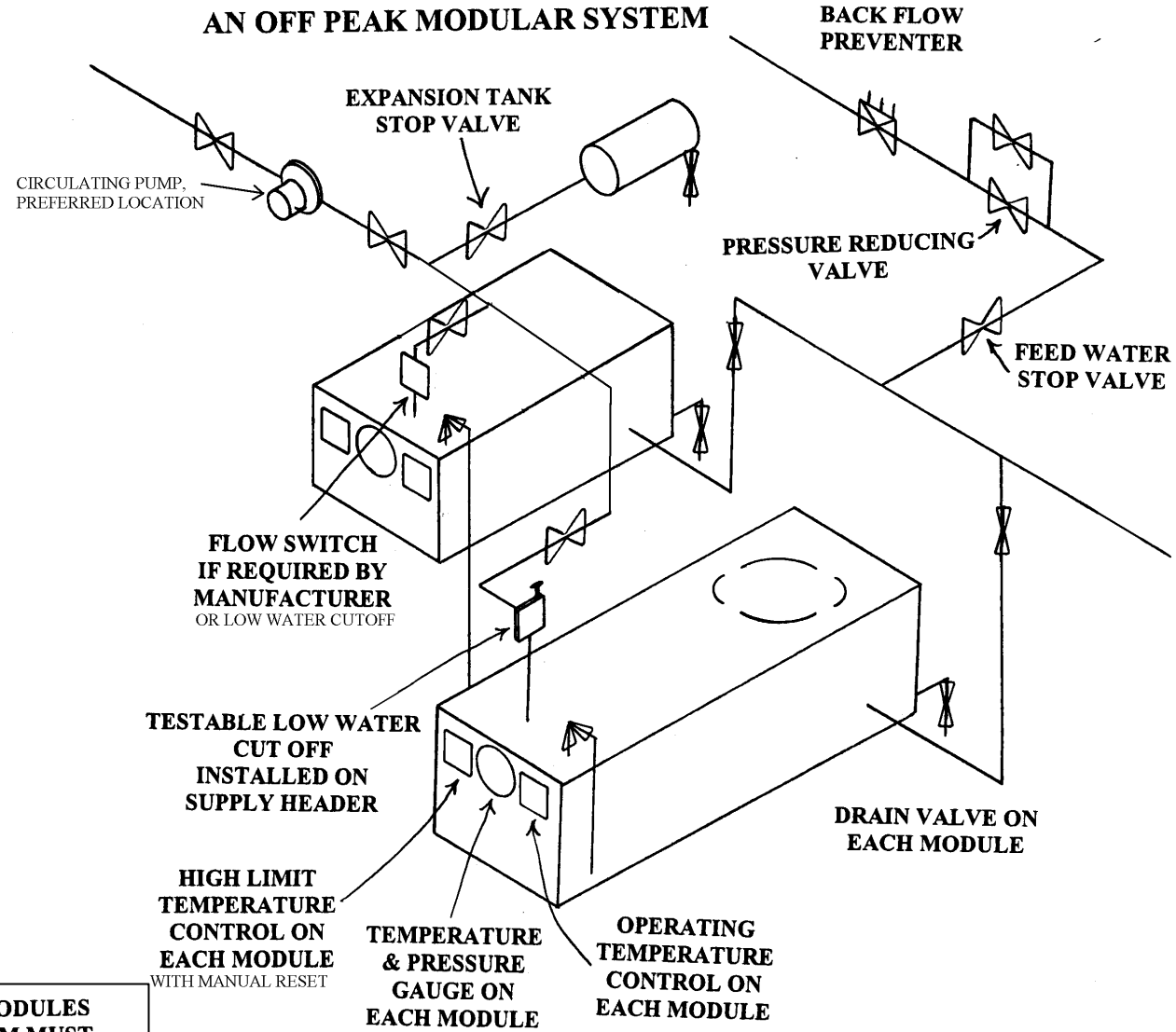


E-stop required if boiler  
exceeds 400,000 BTU/HR

## ONE ACCEPTABLE METHOD OF PIPING BOILERS IN BATTERY



## ONE ACCEPTABLE METHOD OF PIPING AN OFF PEAK MODULAR SYSTEM



**NOTE: INDIVIDUAL MODULES  
IN A MODULAR SYSTEM MUST  
NOT EXCEED 400,000 BTU INPUT  
OR 115 KW**



## Hot Water Supply Boilers cannot be used for Space Heating or Dual-Use is not allowed

- ❑ Using a storage water heater or other hot water supply boiler (HLW stamp) for space heating, or for dual-use domestic and sanitary purposes and space heating, is not allowed.

# Storage Water Heaters and HWS Expansion Tanks

Non-ASME expansion tank - under 5 gal.



- ❑ Storage water heaters are not required to be ASME code, unless they exceed 120 gallons.
- ❑ We inspect storage water heaters and hot water supply boilers over 200,000 BTU/HR in any location we have jurisdiction.
- ❑ Small non-ASME expansion tanks are permitted for hot water supply systems. However, if the expansion tank is **OVER 5 GALLONS** in size it must be an **ASME expansion tank.**

## Pool Heaters

- ❑ Pool heaters smaller than 200,000 BTU/HR input do not fall under our jurisdiction.
- ❑ Pool heaters must be ASME constructed with an “H” or “HLW” designation and be National Board registered.
- ❑ Pool heaters with stop valves installed between the boiler and pool must have a flow switch.

# Matrix and Installer Report...

# Boiler Matrix

## ND BOILER INSPECTION PROGRAM - INSTALLATION MATRIX - Oct 10, 2017

LOW PRESSURE BOILERS, WATER HEATERS, & POOL HEATERS - (DOES NOT INCLUDE OBJECTS IN APARTMENT HOUSES LESS THAN SIX UNITS)


| BOILER INSTALLATION ITEM:                              | CAST IRON BOILER |     | FIRE TUBE BOILER |     | WATER TUBE BOILER |     | WATER HEATERS                  |             | POOL HEATER |
|--|------------------|-----|------------------|-----|-------------------|-----|--------------------------------|-------------|-------------|
|  | HWH              | STM | HWH              | STM | HWH               | STM | STG WT HTR                     | F COIL & WT | F COIL & WT |
| STEAM PRESSURE GAUGE                                   | NO               | YES | NO               | YES | NO                | YES | NO                             | NO          | NO          |
| WATER PRESSURE GAUGE - 1.5 TO 3.5 X SAFETY R. VALVE SE | YES              | NO  | YES              | NO  | YES               | NO  | NO                             | NO          | NO          |
| GAUGE GLASS  | NO               | YES | NO               | YES | NO                | YES | NO                             | NO          | NO          |
| 2 PRESSURE CONTROLS - 1 MANUAL RESET REQUIRED          | NO               | YES | NO               | YES | NO                | YES | NO                             | NO          | NO          |
| 2 TEMPERATURE CONTROLS - 1 MANUAL RESET REQUIRED       | YES              | NO  | YES              | NO  | YES               | NO  | NO                             | YES         | YES         |
| 1 LOW-WATER FUEL CUTOFF - MANUAL RESET/LOCKOUT REQ     | YES              | NO  | YES              | NO  | NO                | NO  | NO                             | NO          | NO          |
| 2 LOW-WATER FUEL CUTOFFS - 1 MANUAL RESET REQUIRED     | NO               | YES | NO               | YES | NO***             | YES | NO                             | NO          | NO          |
| FLOW SWITCH  | NO               | NO  | NO               | NO  | YES***            | NO  | NO                             | YES         | YES         |
| TEMPERATURE GAUGE                                      | YES              | NO  | YES              | NO  | YES               | NO  | NO                             | YES         | YES         |
| PROPER ELECTRICAL WIRING                               | YES              | YES | YES              | YES | YES               | YES | YES                            | YES         | YES         |
| EMERGENCY SHUTDOWN SW - REQUIRED OVER 400,000 INPUT    | YES              | YES | YES              | YES | YES               | YES | NO                             | NO          | YES         |
| BOILER ELECTRICAL SW - REQUIRED ON OR NEAR BOILER      | YES              | YES | YES              | YES | YES               | YES | NO                             | YES         | YES         |
| SAFETY VALVE   | NO               | YES | NO               | YES | NO                | YES | NO                             | NO          | NO          |
| SAFETY RELIEF VALVE                                    | YES              | NO  | YES              | NO  | YES               | NO  | YES (T&P)                      | YES         | YES         |
| PROPER PIPING SUPPORTS                                 | YES              | YES | YES              | YES | YES               | YES | YES                            | YES         | YES         |
| EQUALIZING LOOP  | NO               | YES | NO               | YES | NO                | YES | NO                             | NO          | NO          |
| CLEAN OUTS   | NO               | NO  | NO               | YES | NO                | YES | YES                            | NO          | NO          |
| FEEDWATER PIPING                                       | NO               | YES | NO               | YES | NO                | YES | NO                             | NO          | NO          |
| FEEDWATER STOP & CHECK (BOILER THEN STOP THEN CHECK)   | NO               | YES | NO               | YES | NO                | YES | NO                             | NO          | NO          |
| MAKEUP WATER PIPING                                    | YES              | NO  | YES              | NO  | YES               | NO  | NO                             | NO          | NO          |
| MAKEUP STOP VALVE (BETWEEN BOILER & F/W REGULATOR)     | YES              | NO  | YES              | NO  | YES               | NO  | NO                             | NO          | NO          |
| RPZ BACK FLOW PREVENTER                                | YES              | NO  | YES              | NO  | YES               | NO  | NO                             | NO          | NO          |
| SUPPLY & RETURN VALVES - RATED FOR SYSTEM PRESSURE     | YES              | NO  | YES              | NO  | YES               | NO  | YES                            | YES         | OPTIONAL    |
| EXPANSION TANK - ASME IF OVER 30 PSI S.R. VALVE        | YES              | NO  | YES              | NO  | YES               | NO  | NO                             | NO          | NO          |
| EXPANSION TANK STOP VALVE                              | YES              | NO  | YES              | NO  | YES               | NO  | NO                             | NO          | NO          |
| BLOWOFF VALVE - SIZED TO SAFETY VALVE CAPACITY         | NO               | YES | NO               | YES | NO                | YES | NO                             | NO          | NO          |
| DRAIN VALVE  | YES              | YES | YES              | YES | YES               | YES | YES                            | YES         | YES         |
| FEED WATER REGULATOR WITH PIPED BYPASS                 | YES              | NO  | YES              | NO  | YES               | NO  | NO                             | NO          | NO          |
| SUITABLE FOR FLOOR MATERIAL                            | YES              | YES | YES              | YES | YES               | YES | YES                            | YES         | YES         |
| BOILER CLEARANCES - 36 INCHES ALL AROUND               | YES              | YES | YES              | YES | YES               | YES | YES                            | YES         | YES         |
| PROPER COMBUSTION AIR & VENTING                        | YES              | YES | YES              | YES | YES               | YES | YES                            | YES         | YES         |
| CHIEF BOILER INSPECTOR NOTIFIED OF INSTALLATION        | YES              | YES | YES              | YES | YES               | YES | YES, IF OVER 200,000 BTU INPUT |             |             |
| INSTALLATION FORM SUBMITTED TO CHIEF INSPECTOR         | YES              | YES | YES              | YES | YES               | YES | YES, IF OVER 200,000 BTU INPUT |             |             |

\*\*\*some large HWH water tube boilers may have a low water cutoff instead of a flow switch for low water protection, please consult your inspector

Great tool, notes on the back of the matrix.



# Boiler or Water Heater Installation Report

|  <b>BOILER OR WATER HEATER INSTALLATION REPORT</b><br>NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY<br>BOILER INSPECTION DIVISION<br>SPN 58530 (10-2021)  |  |  |  | Installation Date  |  |
|---|--|--|--|--|--|
| Installer Name  |  | Telephone Number   |  | Email  |  |
| Address   |  | City   |  | State ZIP Code   |  |
| Boiler Owner Name   |  |  |  |  |  |
| Address   |  | City   |  | State ZIP Code   |  |
| Boiler Owner Contact Name   |  |  |  | Telephone Number   |  |
| Boiler Location Name  |  |  |  |  |  |
| Address   |  | City   |  | State ZIP Code   |  |
| Specific On-Site Location of Boiler   |  | Specific Contact Name  |  | Telephone Number   |  |
| <b>OBJECT INFORMATION</b>   |  |  |  |  |  |
| Manufacturer  |  | Serial Number  |  | Year Built   |  |
| Use   |  | Vessel Type  |  | Fuel Type  |  |
| MAWP  |  | MAWT   |  | BTU Input BTU Output   |  |
| Safety Relief Valve Set Pressure LWCO (Manual Reset W/Logout) Or Flow Switch - Brand & Type   |  |  |  |  |  |
| Total Safety Relief Valve Installed Capacity  |  | Manual Reset Hi Limit? <input type="checkbox"/> Yes <input type="checkbox"/> No  |  | Each Operating & Limit Controls Set (What PSI/DEG F)?  |  |
| EXPANSION TANK (Hot water, Hot Water Supply)  |  | Type <input type="checkbox"/> Overhead <input type="checkbox"/> Bladder <input type="checkbox"/> ASME Constructed <input type="checkbox"/> Yes <input type="checkbox"/> No |  | MAWP Gallon Size   |  |
| COMBUSTION AIR (Must have proven comb. air prior to ignition)   |  | Unobstructed Openings  |  | Power Fan (CFM)  |  |
| VENTING   |  | Vent Size  |  | <input type="checkbox"/> Power <input type="checkbox"/> Atmospheric <input type="checkbox"/> Stack Damper <input type="checkbox"/> Yes <input type="checkbox"/> No |  |
| STOP VALVES (Hot Water Heat, Hot Water Supply and Steam)  |  | Supply Size  |  | Return Size  |  |
| Boiler External Piping Per ASME Code B31.1 (Required For High Pressure Boilers - 40HP or More) <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA   |  | Manufacturers Rating Plate Installed? <input type="checkbox"/> Yes <input type="checkbox"/> No   |  |  |  |
| Manufacturers Recommended Minimum Clearances:   |  | Actual Clearances:   |  |  |  |
| Top Base Sides  |  | Top Base Sides   |  |  |  |
| Does This Object Replace An Existing One? <input type="checkbox"/> Yes <input type="checkbox"/> No  |  | If Yes, Enter State Number Of Object Removed:  |  |  |  |
| Notes And Additional Recommendations And Remarks By Installer   |  |  |  |  |  |
| I hereby certify that the installation complies with the North Dakota Boiler Laws and Rules.  |  |  |  |  |  |
| Installer Name (Print)  |  | Installer Signature  |  |  |  |
| North Dakota Department of Environmental Quality<br>4201 Normandy Street<br>Bismarck, ND 58503-1324<br>Telephone (701) 328-5150<br>Fax (701) 328-5200<br>Email: <a href="mailto:nuboliermap@nd.gov">nuboliermap@nd.gov</a><br><a href="https://deg.nd.gov/Director/BJP/">https://deg.nd.gov/Director/BJP/</a> |  |  |  |  |  |

- ❑ This form is now a requirement, not an option, and must be filed with the Chief Boiler Inspector. Verbal reports are nice, but do not meet the requirements of Code. This form is now fillable and available on our website.
- ❑ The completed form must be mailed, scanned, emailed or faxed to the Chief Inspector.

# What Not To Do...

# Homemade boiler system... definitely non-code...



Elements in galvanized pipe, where do I even start ... sent to us by Kimberley from the Plumbing Board.

When the  
first safety  
valve leaks,  
install a  
second?







The discharge piping from a hot water heat safety relief valve must go towards the floor, not vertical from the safety relief valve – water flows downhill



Safety relief valve  
inside the boiler  
cover and installed  
horizontal, no low  
water cutoff...



Safety relief  
valve in the  
feed line?





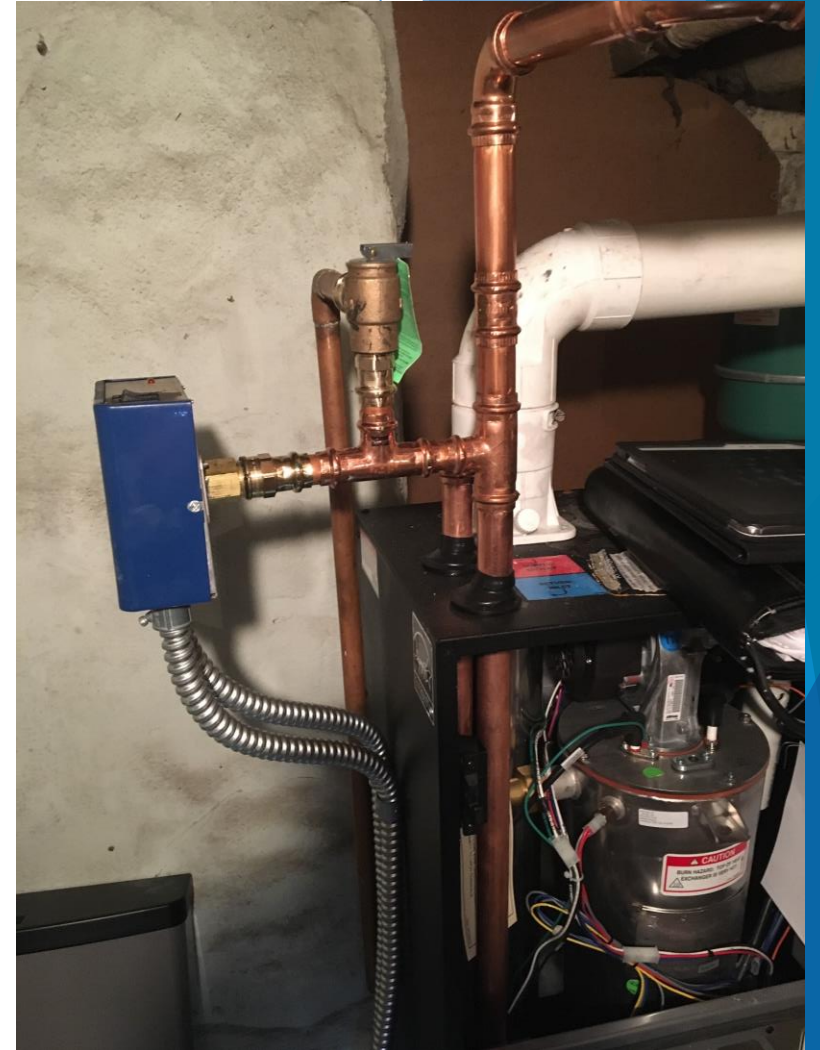
This safety valve is reduced in size – boiler piping tapping is smaller, upsizes to install large valve. Valve cannot discharge full capacity due to reduction of inlet to valve.



Low water cutoff on the secondary piping, no outlet stop valve. Common mistake...



Safety relief valve and low water fuel cutoff are installed in the return (cold) side of the boiler. Also, the line to the low water fuel cutoff is long with no air bleed, this is asking for nuisance tripping of the control.





Residential low  
water fuel cutoff  
– has test, but no  
manual reset.



Nice install,  
but low water  
fuel cutoff on  
return instead  
of supply...





Isolated both  
low water  
cutoff and  
manual reset  
high limit from  
boiler



Feed line in wrong order...  
Backflow preventer must be on high pressure side of feed water regulator. The piped bypass is only for the regulator.



No expansion tank  
stop valve





Basic system – still need to add all the controls...stop valves, low water fuel cutoff, expansion tank stop valve, boiler drain, safety valve is horizontal and missing discharge piping.





## Summary

- ❑ Many items must be taken into consideration on every boiler installation.
- ❑ Use Manufacturer's Installation Manual to help organize process and what you need.
- ❑ Call with any questions prior to starting an installation.

# QUESTIONS?

## Website:

- ❑ <https://deq.nd.gov>
- ❑ Click on Office of the Director
- ❑ Click on Boiler Inspection Program

The background features abstract, overlapping geometric shapes in various shades of blue, primarily on the left and right sides, framing a central white area.

Thank You